ATTACHMENT 8

2014 EXECUTIVE REPORT-
EXTERIOR RENOVATION INVESTIGATIVE STUDY

March 2014
Milwaukee County | DAS-FM-AE&ES Project No.: O118-13449
Uihlein/Wilson Architects Project No.: 13-121

# EXECUTIVE REPORT

## EXTERIOR RENOVATION INVESTIGATIVE STUDY

### MILWAUKEE COUNTY HISTORICAL SOCIETY

910 North Old World Third Street
Milwaukee, Wisconsin 53203

**PROJECT TEAM:**

**ARCHITECT**

**Uihlein/Wilson Architects, Inc.**
322 East Michigan Street
Milwaukee, Wisconsin 53202

**CONSULTANTS**

**Masonry Restoration**
Spray-O-Bond Company
4500 West Mitchell Street
Milwaukee, Wisconsin 53214

**Dimensional Cut Stone**
Old World Stone, Ltd.
1151 Heritage Road
Burlington, ON L7L 4Y1 Canada

**Structural Engineering**
Wiss, Janney, Elstner Associates, Inc.
250 East Wisconsin Avenue Ste. 1800
Milwaukee, Wisconsin 53202

**Plumbing Engineering**
Thunderbird Engineering, Inc.
7665 North Port Washington Road
Milwaukee, Wisconsin 53217

**Geotechnical Engineering**
K. Singh & Associates, Inc.
3636 North 124th Street
Wauwatosa, Wisconsin 53222

# I. Purpose of the Study

Precarious conditions of the balustrade and cornice masonry assemblies necessitated this investigative study of the Milwaukee County Historical Society building envelope of Indiana limestone with extensive copper detailing. The goals of the study are to conceptualize a restoration plan that accomplishes these primary goals:

1. Prevent danger to the public from deteriorated limestone building elements

2. Complete the restoration of a nationally registered, Milwaukee County landmark edifice.

# II. Methodology

A visual survey of the building exterior identified two investigation areas, typifying the worst-case conditions. At the southern-end (facing Kilbourn Avenue) the investigation area included a two-bay length of the limestone balustrade. An assessment of the limestone masonry balustrade conditions was made by means of a methodical deconstruction. The structural integrity of the masonry-encased steel channels and anchor rods was also investigated. At the northwestern-end (facing Old World 3rd Street), the cartouche/keystone assembly was assessed in conjunction with the adjacent cornice assembly.

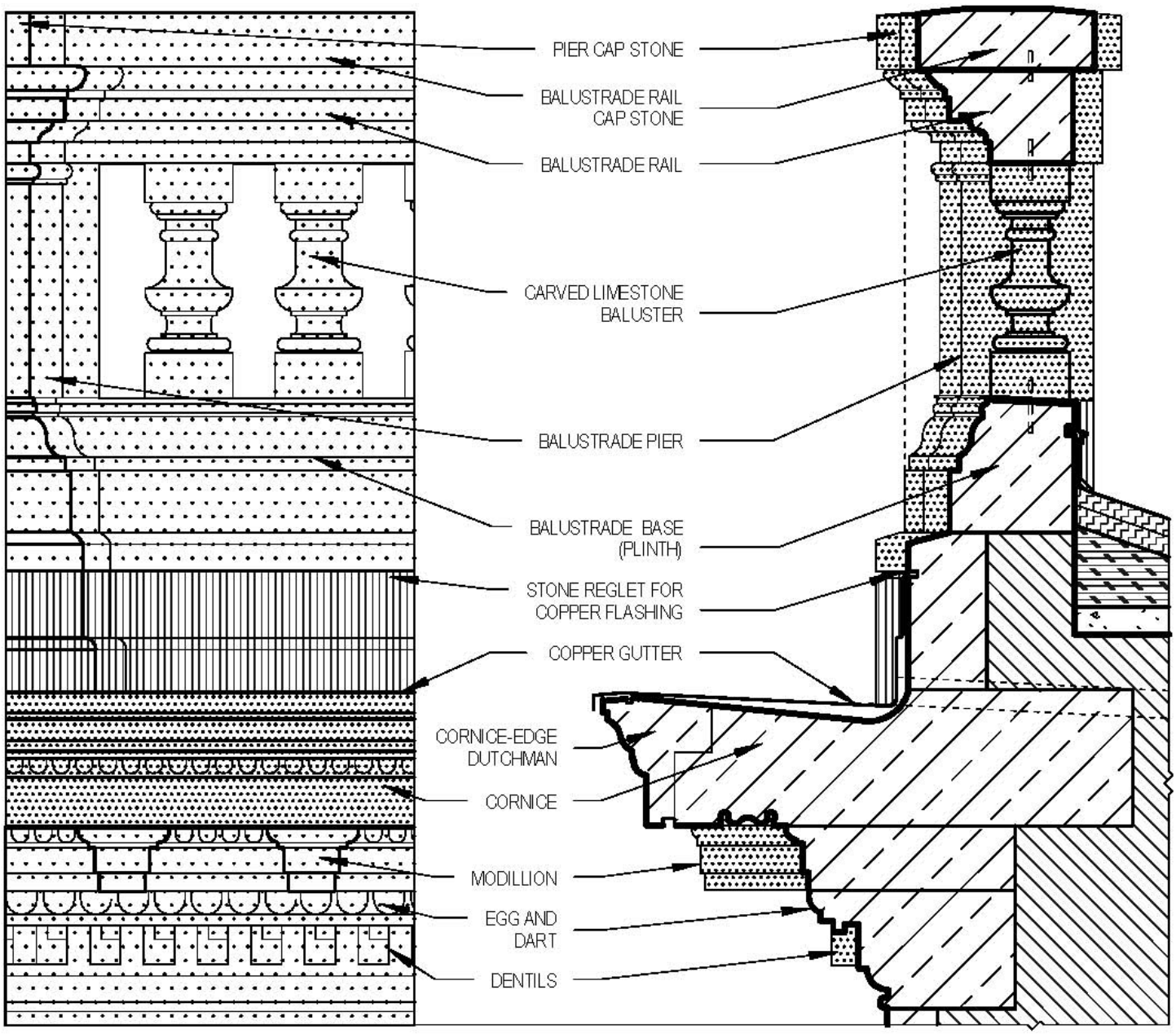
All deconstructed balustrade stone units have been surveyed, palletized, and stored at the Milwaukee County Jackson Park Maintenance Facility. The deconstructed investigation area has been rendered water-tight. The entire parapet building perimeter is re-wrapped with the safety netting previously installed by Milwaukee County.

The testing of all six plumbing connections (cornice to roof drains) and downpipes (rooftop to basement) was a part of this investigative study.

The analysis of the building foundation recharge system, “Site Groundwater Evaluation Report”, also part of this study, is under separate cover.

## III. Glossary of Terms – Limestone Units

Inspired by the Petit Trianon (on the grounds of the Palace of Versaille in France) this building was designed by Architects Charles Kirchoff and Thomas Leslie Rose. The construction was completed in 1913. In 1973, the building was registered by National Park Service.
The terminology of the classical façade units of carved and structural Indiana limestone is illustrated here.



# IV. Findings

The technical team assessed the significant deterioration to the Indiana limestone assemblies.

## 1. Balustrade

The limestone/brick masonry parapet deterioration evidences open and/or failed mortar joints, missing and cracked balusters, and deteriorated balustrade bases (plinth). The balustrade pier showed irreparable conditions provoked by water infiltration resulting in corroded mild steel strap anchors and degraded common brick, necessitating its total dismantling.



## 2. Cornice

The on-going deterioration of the projecting limestone cornice is primarily due to failed flat-seams and inadequate drainage of the copper gutter. A section of the gutter was cut away to assess the condition of the limestone unit. Previous power nailing to anchor the copper gutter had split the limestone cornice edge. A cementitious epoxy material, painted to match the adjacent stone, was employed to patch the fractured edge. In addition to these conditions of dangerous spalling, water was observed infiltrating the limestone entablature. This seepage behind the carved limestone units underneath the projecting cornice, weakens the brick back-up wall assembly and the embedded mild steel strap anchors.



**3. Cartouche**

Seven carved cartouche/keystone units decorate the building at the top of the stone window arches. The cartouche in the northwest corner is seriously displaced and requires stabilization. The displacement is apparently provoked by a weakening of the wall assembly.



**4. Façade Cladding**

The cracking and spalling of limestone façade cladding typifies the oxide-jacking from embedded mild-steel masonry anchors. Some of these spalls were removed by Milwaukee County, exposing the corroding strap anchor.

**5. Plumbing/Roof Drains**

The plumbing testing for the full length of the downpipes, starting from the cornice conductors and rooftop drains down to the basement, revealed no blockage or leakage. Likewise, no issues were found at the material transitions between the copper-sheathed cornice conductors and cast-iron downpipes.



**6. Structural Steel**

During deconstruction of the southern-end balustrade, deeper investigation into a structural steel anchor rod revealed minimal corrosion with no diminished structural integrity. The "C" channel embedded in the entablature similarly was examined and found to have slight corrosion and no degradation. The masonry surround was dry.

# V. Recommendations *(Architectural Drawing Reference)*

**1. Balustrade**

With the exception of the seven bays of solid balustrade, this study recommends a deconstruction of the balustrade down to the balustrade bases (plinth). Much of the balustrade assembly (cap stone, rail, baluster and plinth) remains sound and can be retained. The deconstruction is required to provide new alloy-coated copper flashing and stainless steel pins at all horizontal connections of the upper balustrade units.

A. Balusters

This study identified missing and cracked balusters for replacement by newly fabricated limestone balusters. The Masonry Contractor will remove an existing baluster. The Stone Contractor will use the removed baluster as a template. The existing mild steel anchor pins will be cored-out at all balusters. Stainless steel pins shall be provided, with copper thimbles for flashing conditions. New alloy-coated copper flashing will safeguard the longevity of the limestone balusters. *(A001, A101)*

B. Piers

The solid masonry piers will be deconstructed and the limestone facing units, salvaged. All sixteen, individual piers shall have a new common brick core. The salvaged, cleaned limestone units will face this brick core. The pier's assembly shall be anchored by stainless steel masonry strap anchors.

C. Solid Balustrade

The stone cladding of the solid balustrade will be re-pointed. The previously mortar-set cap stones will be pinned and have new, alloy-coated copper flashing. The balustrade brick back-up wall had been patched with roofing pitch. Metal panels installed on hat channels protect the brick wall. With verification of air circulation, it is anticipated that these metal panels will remain in place. *(1/A301)*

D. Flashing

The alloy-coated copper, adopted for the cornice gutter, will also flash the individual pier cap stones, balustrade cap stones and baluster base units (plinth). *(1/A302)*

**2. Cornice**

The limestone cornice unit is designed to hold an alloy-coated copper gutter with continuous flashing up the back wall of the assembly. The cornice units are rectilinear in form with the exception of the curvilinear units located at the building's southeast end.

A. Indiana Limestone Dutchman

The severely, spalled cornice edge can be repaired by removing the damaged edge. A new piece of stone will be keyed to the existing 7000 lb. limestone unit. This limestone Dutchman covers the entire cornice of the building perimeter. The new Indiana limestone will have a different patina. It will appear as an imperfect color match to its weathered receiver. *(A301, 3/A401)*

B. Flashing
The existing flashed-in cornice conductor opening will be replaced by sidewall drains to assure efficient drainage. The carved limestone units, below the projecting cornice, will be cleaned of all efflorescence and accumulated dirt and grime. *(2/A401)*

C. Cornice Drainage
An alloy-coated copper gutter, flat seamed, will line the entire stone projection from the drip edge to the up-wall flashing. Expansion joints will be installed at the six drain locations. A watertight membrane and complete repointing of the cornice mortar joints will inhibit water infiltration into the wall assembly below. *(1/A401)*

**3. Cartouche**

The re-alignment of the most displaced limestone cartouche will necessitate the complete deconstruction and rebuild of the wall's full-depth including the solid balustrade above. An assessment of the conditions necessitating the displacement will inform the subsequent stabilization of at least four of the remaining six cartouche assemblies. (Total of seven cartouche.) Alternatively, given that the assembly works as a true arch, a repair-in-place is feasible. Approximated life-span is 25 years. The visual displacement would remain. *(1/A301)*

**4. Façade Indiana Limestone Cladding**

Limestone repairs in the facades include: the spalled, cracked units; failed mortar joints. The attached photographic narratives and annotated architectural drawings illustrate the conditions and the scope of the restorative interventions.

**5. Building Foundation**

Minimal settlement has occurred due in part to the good condition of the wood piles underlying column footings. In order to insure the continued integrity of the wood pile, a water recharge system will be engineered according to recent data gathering of water level conditions. The installation of this system is beyond the scope of this report.

# VII. Construction Details

**INDIANA LIMESTONE PARAPET** (open and solid balustrade, entire perimeter)

- Repair limestone balusters and/or provide replacement units
- Reconstruct limestone assemblies surveyed in investigative study
- Core, remove, replace all baluster pins at rail top caps and baluster bases (plinth)
- Anchor materials: Stainless steel pins and strap anchors
- Flashing materials: Alloy-coated copper; copper thimbles
- Provide through-wall (receiver and counterflashing) alloy-coated copper flashing at baluster bases (plinth)
- Deconstruct and rebuild all stone-clad, brick-core balustrade piers
- Pin, flash all balustrade rail top caps and solid balustrade top caps
- Pin, re-flash all pier top-caps
- Repoint all failed, failing mortar joints; mortar type 'O' (typical)
- Skyward-facing mortar joints will have sealant
- Assure air circulation at existing formed metal panels over brick back-up walls
- Roofing repair at southern-end investigation area

**INDIANA LIMESTONE CORNICE** (restoration of entire perimeter)

- Saw-cut and remove limestone cornice edge for the entire building perimeter
- Provide limestone repair utilizing "Dutchman" technique
- Masonry anchors: Stainless steel rods/pins, vertical strap anchors
- Provide sidewall drains at six, copper-sleeved cornice conductors
- Trowel-in drainage leveler (max 2", lightweight material)
- Provide alloy-coated copper gutter and flashing at cornice with expansion joints
- Provide ice-and-water shield membrane, high-temperature underlayment
- Repoint all mortar joints; sealant at all skyward-facing mortar joints
- Clean (efflorescence, dirt and grime) limestone units below the cornice projection

**INDIANA LIMESTONE CARTOUCHE** (Keystone units, one assembly re-alignment)

- Deconstruction and rebuild of one displaced cartouche with keystone units

**TOOLED INDIANA LIMESTONE FAÇADE** (Repair technique of spalled units)

- The surface of the limestone Dutchman shall have a tooling pattern match to the adjacent limestone. (Tooling pattern is "batted" with a designated number of vertical lines per inch, e.g. 8 lines per inch.) A light sandblasting of the limestone Dutchman shall blend the new piece into the existing limestone surround.
- As identified on the architectural drawings, failing/failed mortar joints shall be repointed.

CornerStone Plumbing LLC
Design ◆ Build ◆ Service

| | | | |
|---|---|---|---|
| TO: | Thunderbird Engineering, Inc | DATE: | January 3rd, 2014 |
| | 7665 N. Port Washington Rd. | PROJECT: | Milwaukee Historic Center |
| | Milwaukee, Wi. 53217 | ATTN: | Mr. Bob Wagner |

The following was professionally surveyed by one of Our State of Wisconsin License Plumbers, Mr. Nick Kahle.

**Cornerstone Plumbing's Conclusions were based on the following information He seen by Camera:**

- South center roof drain/scupper – ran camera down roof drain 50'. Ran camera through scupper to connection with roof drain. Piping was in good condition. Dumped water down drains. Checked for leaks inside. Found no issues.

- Southwest roof drain and scupper – ran camera down drain 50'. Ran camera through scupper to connection with roof drain. Piping was in good condition. Dumped water down drains. Checked inside for leaks. Found no issues.

- Southeast roof drain/scupper - Ran camera down roof drain 40'. Ran camera through scupper to connection with conductor. Piping looked to be in good condition. Dumped water down drains. Checked inside for leaks. Found no issues.

- Northwest roof drain/scupper – ran camera down roof drain 60'. Ran camera through scupper to connection with conductor. Piping looked to be in good condition. Dumped water down drains. Checked inside for leaks. Found no issues.

- Northeast roof drain/scupper – ran camera down roof drain 50'. Ran camera through scupper to connection with conductor. Piping looked to be in good condition. Dumped water down drains. Checked inside for leaks. Found no issues.

- Roof drain/scupper by roof access – ran camera down roof drain 40'. Ran camera through scupper to connection with roof drain. Piping looked to be in good condition. Dumped water down drains. Checked inside for leaks. Found no issues.

Thank You,

*Rob Widowski - M.P. #226398*

**Rob Widowski – Master Plumber #226398**
**Service Manager**
**Cornerstone Plumbing, LLC**

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UIHLEIN
WILSON
ARCHITECTS


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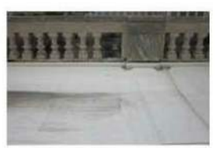
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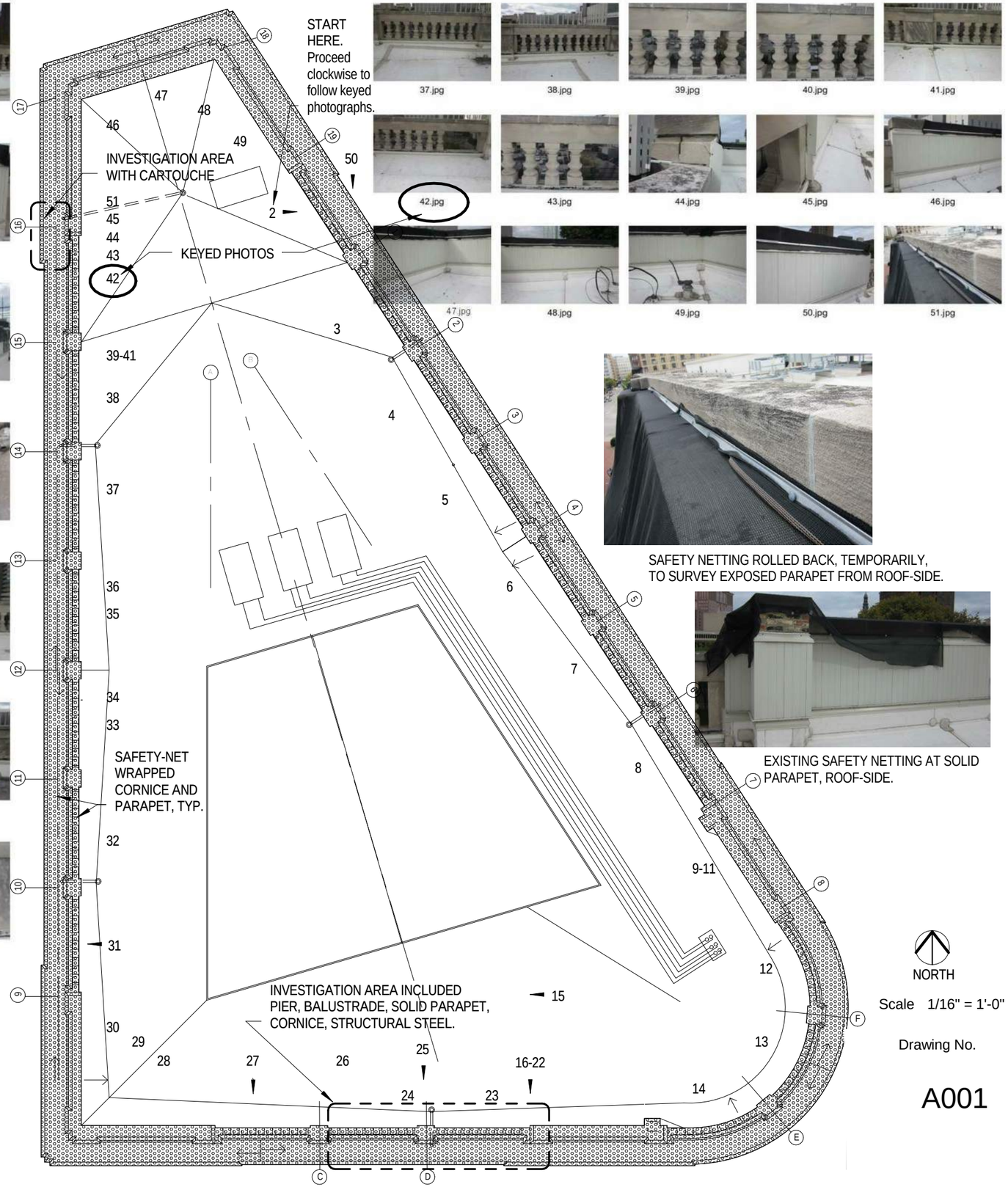


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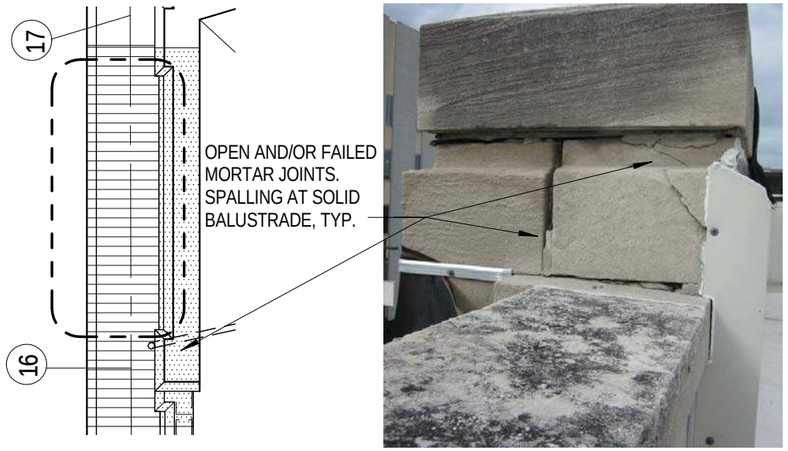
UIHLEIN WILSON ARCHITECTS

| | |
|---|---|
| Title | PARAPET PLAN - EXISTING CONDITIONS |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
| Project Number | Milwaukee County O118-13449; UWA 13-121 |
| Date | March 2014 |
| Drawn by | UWA |

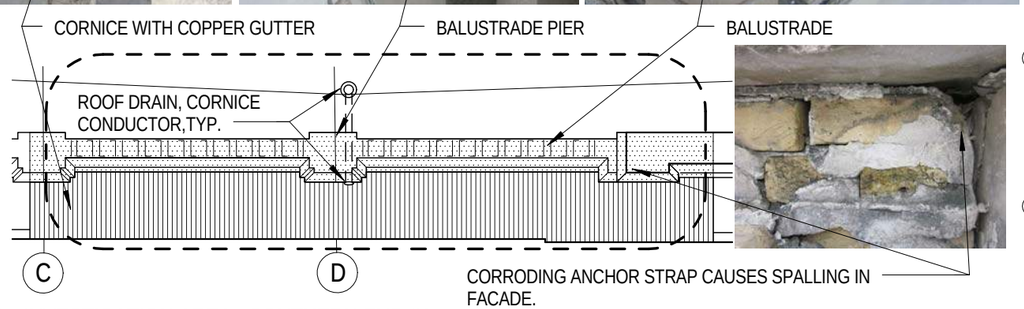
Scale 1/16" = 1'-0"

Drawing No.

A001

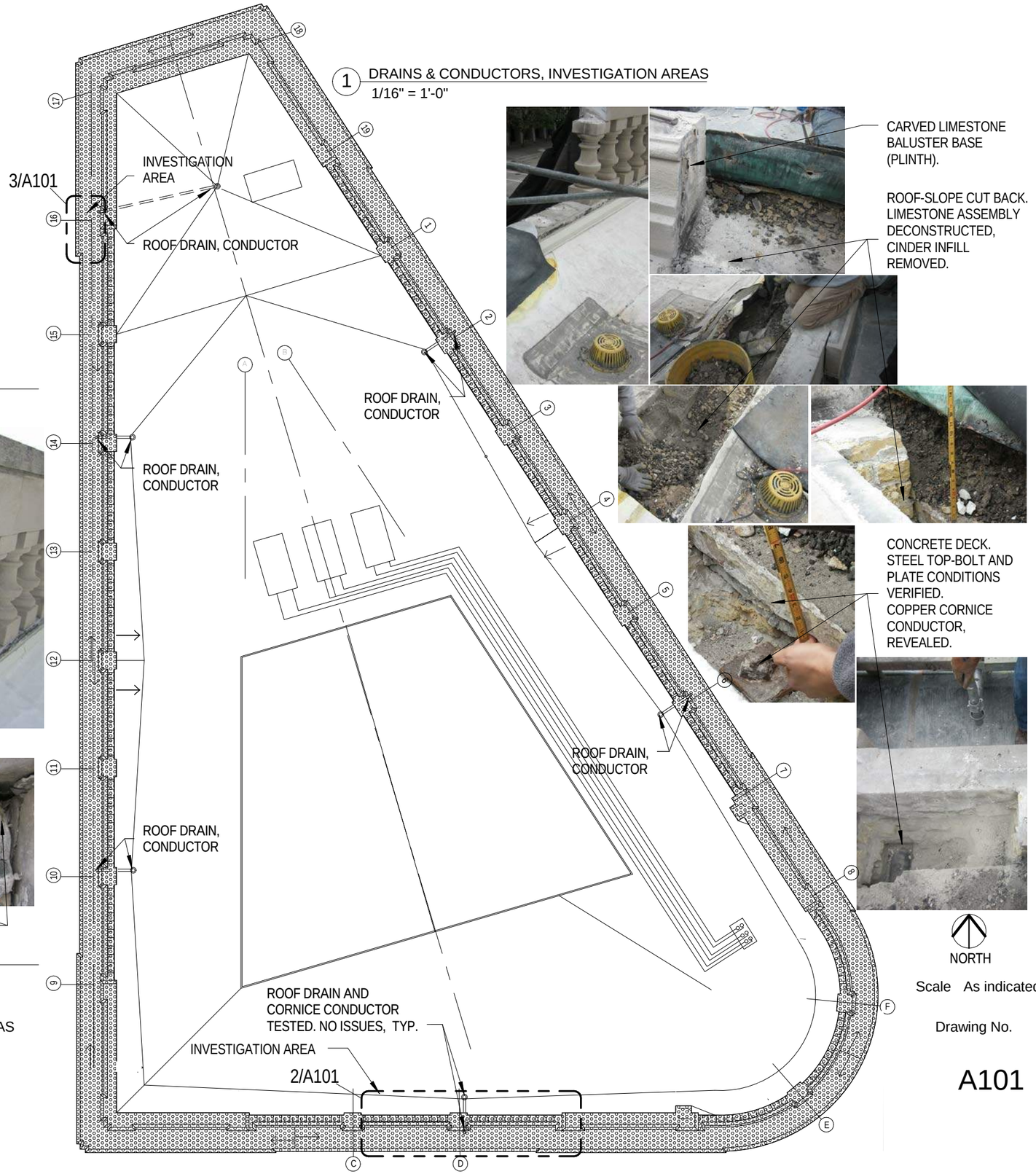



3 INVESTIGATION AREA - NORTHERN END (3rd St.)
1/8" = 1'-0"


2 INVESTIGATION AREA - SOUTHERN END (Kilbourn Ave.)
1/8" = 1'-0"

1 DRAINS & CONDUCTORS, INVESTIGATION AREAS
1/16" = 1'-0"



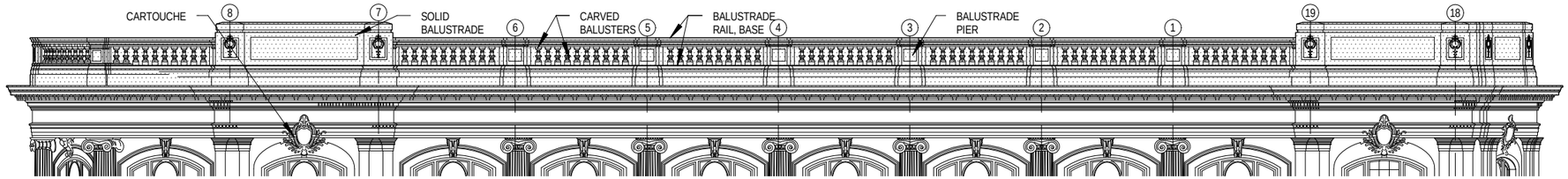

Scale As indicated

Drawing No.

A101

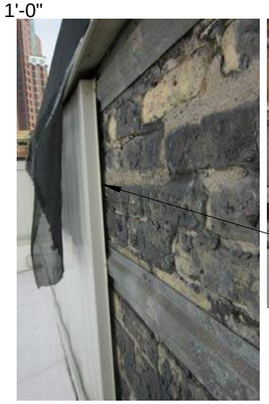
UIHLEIN WILSON ARCHITECTS

| | |
|---|---|
| Title | ROOFTOP PLAN - DRAINS AND CONDUCTORS, INVESTIGATION AREAS |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
| Project Number | Milwaukee County O118-13449; UWA 13-121 |
| Date | March 2014 |
| Drawn by | UWA |




3 EAST - ELEVATION (PARK SIDE)

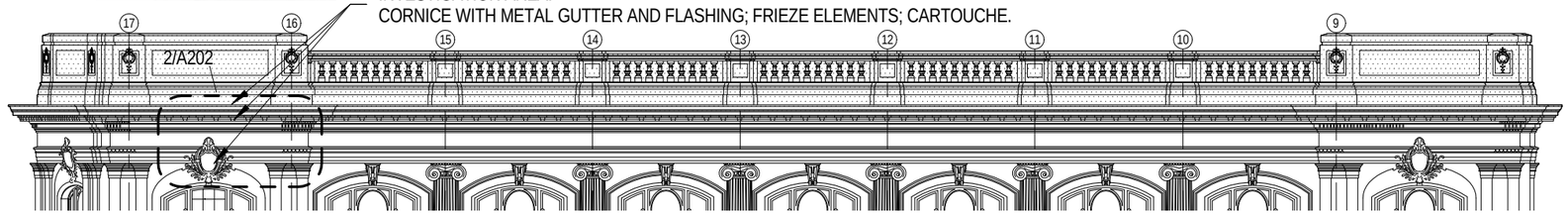
1/16" = 1'-0"



REMOVED METAL PANEL AT SOLID BALUSTRADE TO VERIFY CONDITION OF BRICK BACK-UP WALL.

SPALLED BALUSTRADE BASE, TYP.

INVESTIGATION AREA:
CORNICE WITH METAL GUTTER AND FLASHING; FRIEZE ELEMENTS; CARTOUCHE.




2 WEST ELEVATION (OLD WORLD THIRD ST.)

1/16" = 1'-0"

ROTATED FACADE STONE OUTWARD TO VERIFY CONDITION OF STRUCTURAL STEEL CHANNELS, ANCHOR ROD.




1 SOUTH ELEVATION (KILBOURN AVE.)

1/16" = 1'-0"

PARAPET FACTS *field verify

PARAPET:

| | |
|---|---|
| PERIMETER at cornice edge | 487 ft.* |
| PERIMETER at parapet edge | 461 ft.* |
| BALUSTRADE | 330 ft.* |
| BALUSTRADE, SOLID | 131 ft.* |
| BALUSTRADE BAYS | 20 |
| CARVED BALUSTERS | 10 per bay |
| BALUSTRADE PIERS | 16 |

CARTOUCHE UNITS:

| | |
|---|---|
| NORTH ELEVATION | 1 location |
| EAST ELEVATION | 2 locations |
| WEST ELEVATION | 2 locations |
| SOUTH ELEVATION | 2 locations |
| TOTAL | 7 |

LIMESTONE:

INDIANA LIMESTONE - COLOR: BUFF; GRADE: SELECT

METAL:

PINS, STRAP ANCHORS: MILD STEEL (EXISTING)
PINS, STRAP ANCHORS, RODS: SS (PROPOSED)
FLASHING: GALVANIZED STEEL; ALUMINUM (EXISTING)
FLASHING: Z-T ALLOY COATED COPPER (PROPOSED)

CORNICE GUTTER AND FLASHING:

COPPER, (EXISTING)
ZINC-TIN ALLOY COATED COPPER (PROPOSED)

CORNICE CONDUCTOR:

COPPER. SHEATHED IN 1989

ROOF DRAINS - CAST IRON. INSTALLED IN 2010
ROOF DRAIN DOWNPIPES - CAST IRON, 4" diam. ORIGINAL

UIHLEIN WILSON ARCHITECTS

| | |
|---|---|
| Title | BUILDING ELEVATIONS AT PARAPET |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
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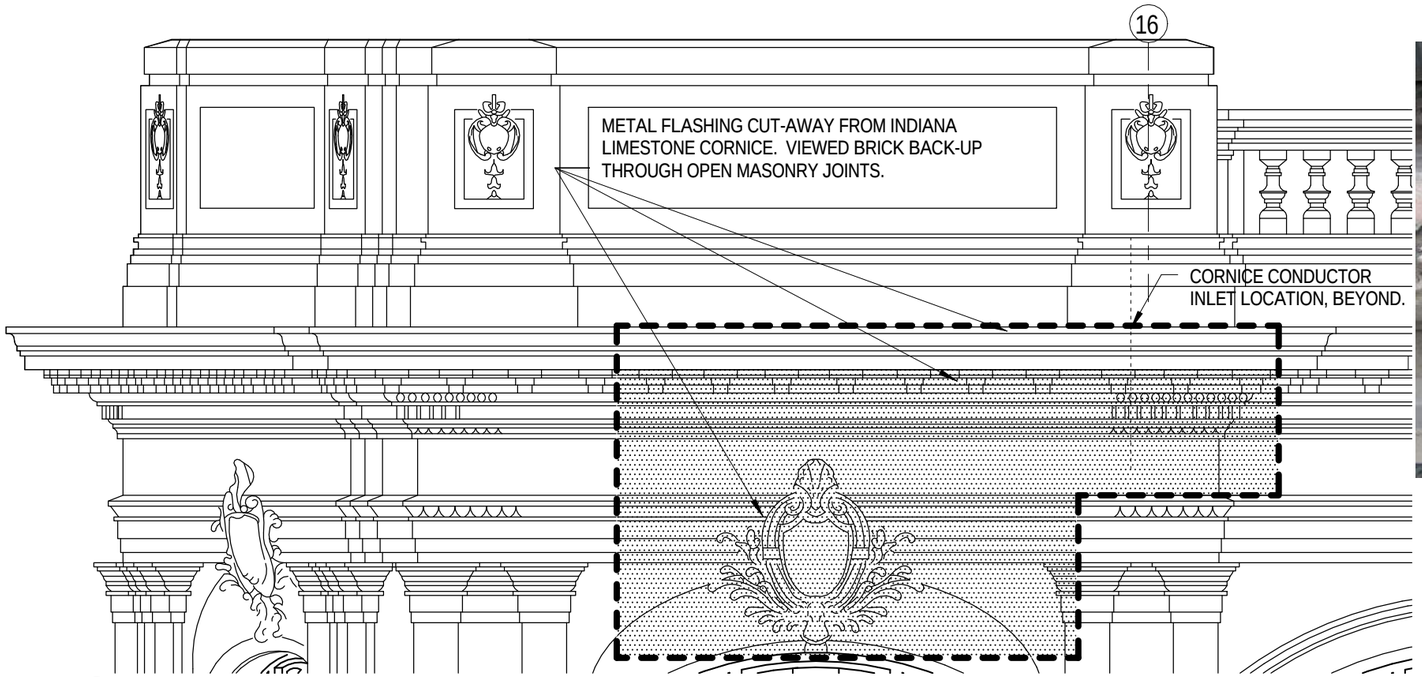
| Date | March 2014 |
| Drawn by | UWA |

Scale 1/16" = 1'-0"

Drawing No.

A201



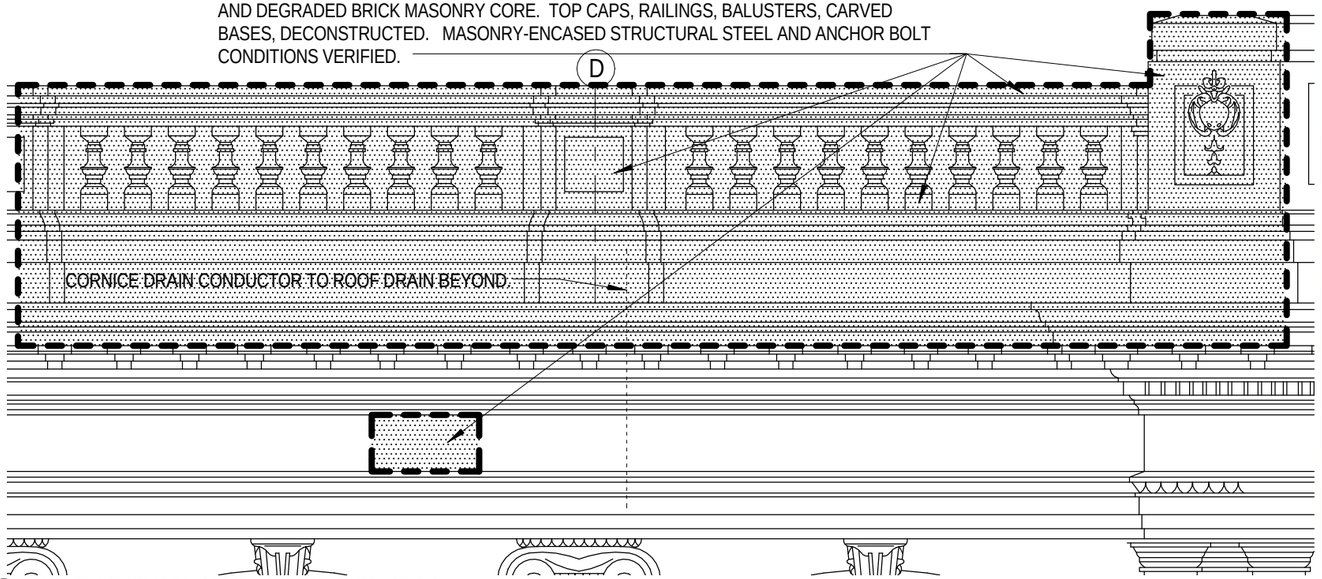

2 WEST ELEVATION - INVESTIGATION AREA

1/4" = 1'-0"

COPPER GUTTER REMOVED. REVEALED WET LIMESTONE CORNICE AND THE SEVERELY-SPALLED EDGE. PAST MAINTENANCE HAD PATCHED AND PAINTED THE CORNICE EDGE.

CONSTANT DRIPPING OF LONG-STANDING WATER IN CORNICE GUTTER. EVIDENCE OF SEEPAGE INTO LIMESTONE MASONRY WALL ASSEMBLY.

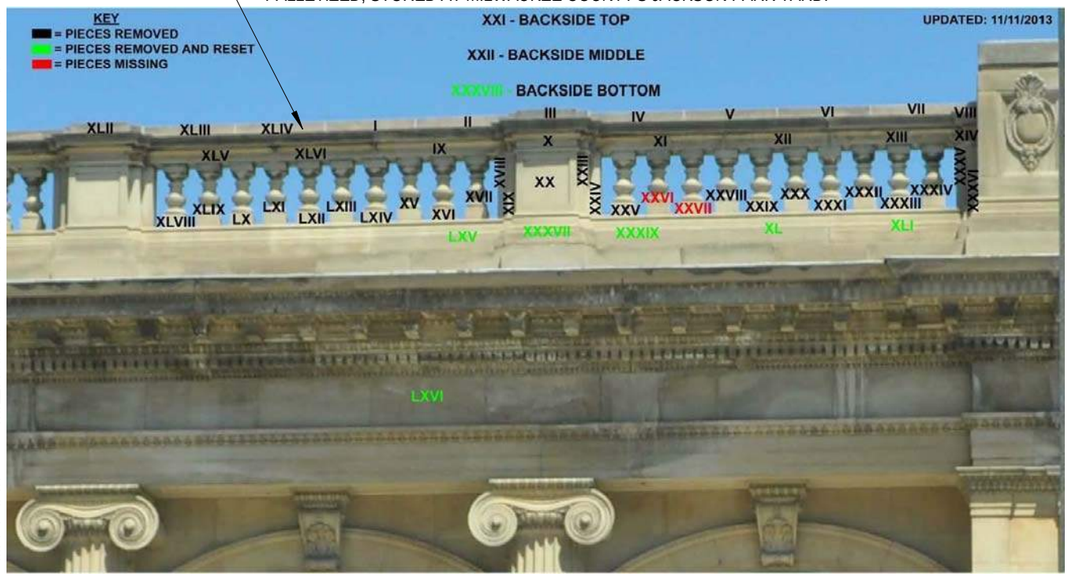
INDIANA LIMESTONE CLADDING PARTIALLY DECONSTRUCTED AT SOLID BALUSTRADE. BALUSTRADE PIER ASSEMBLY DECONSTRUCTED. FOUND CORRODED STRAP ANCHORS AND DEGRADED BRICK MASONRY CORE. TOP CAPS, RAILINGS, BALUSTERS, CARVED BASES, DECONSTRUCTED. MASONRY-ENCASED STRUCTURAL STEEL AND ANCHOR BOLT CONDITIONS VERIFIED.




1 SOUTH ELEVATION - INVESTIGATION AREA

1/4" = 1'-0"

INDIANA LIMESTONE UNITS DECONSTRUCTED, SURVEYED, NUMBERED, PALLETIZED, STORED AT MILWAUKEE COUNTY'S JACKSON PARK YARD.



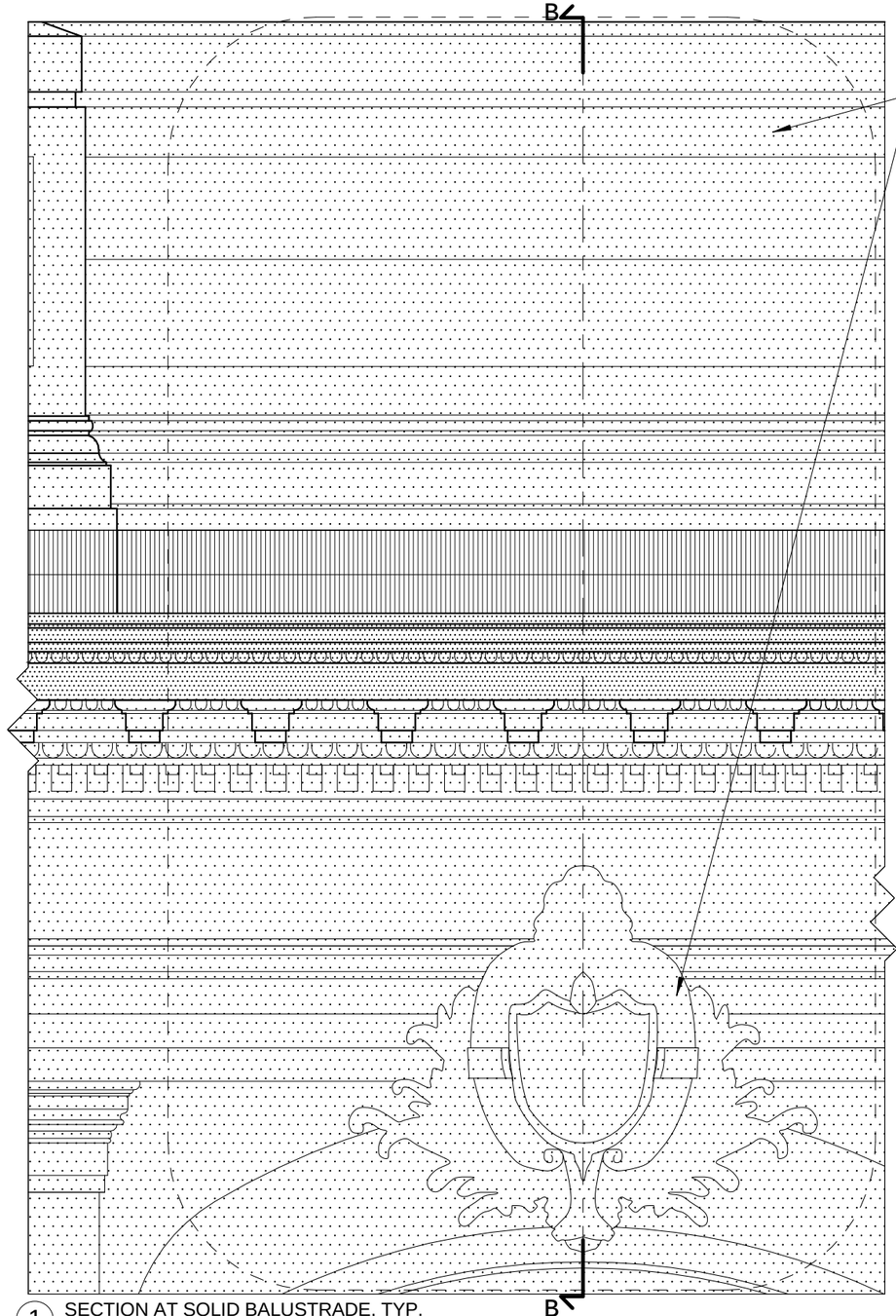

Scale 1/4" = 1'-0"

UIHLEIN WILSON ARCHITECTS

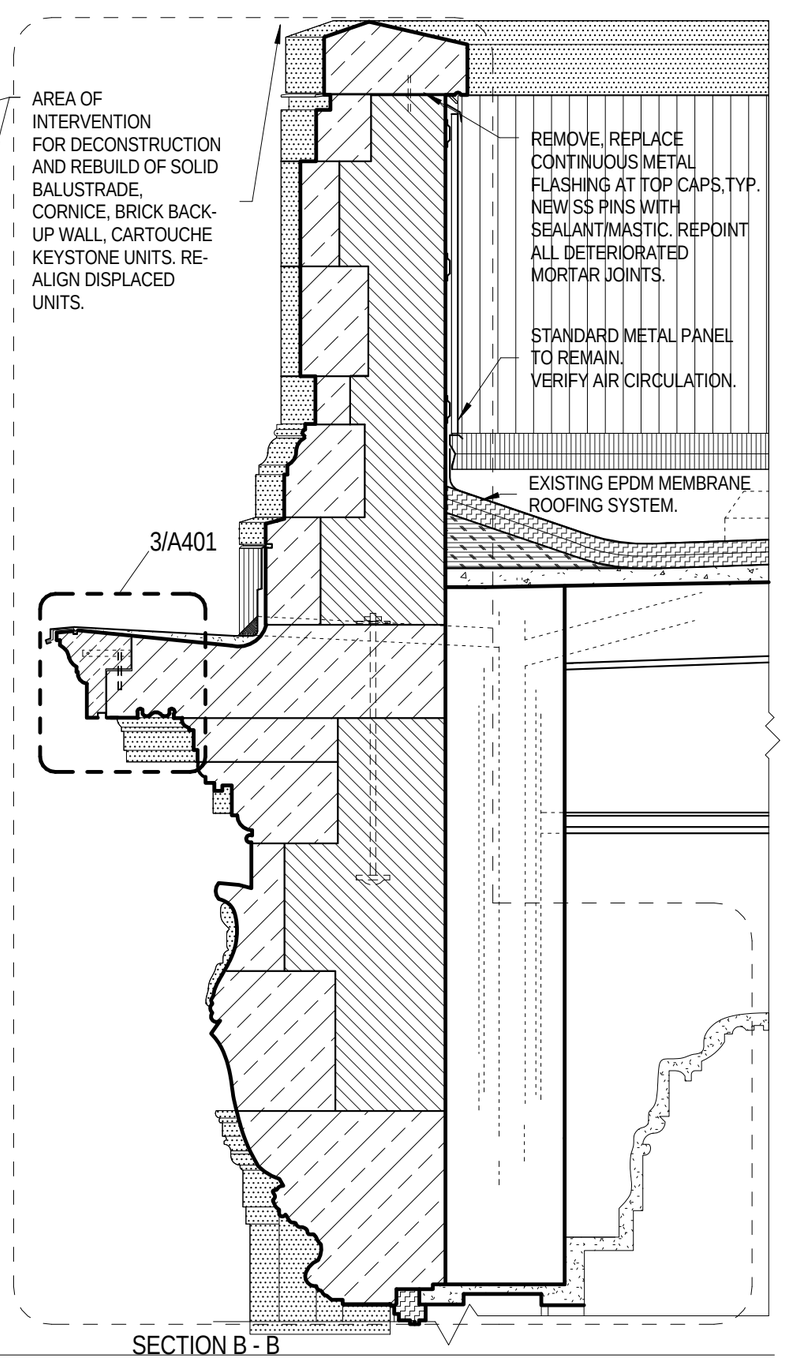
| | |
|---|---|
| Title | PARAPET ELEVATION DETAILS - AREAS OF INVESTIGATION |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
| Project Number | Milwaukee County O118-13449; UWA 13-121 |
| Date | March 2014 |
| Drawn by | UWA |

Drawing No.

A202



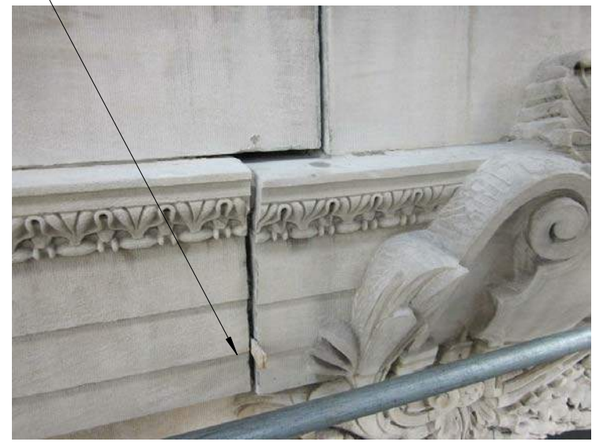

1 SECTION AT SOLID BALUSTRADE, TYP.
1/2" = 1'-0"




SECTION B - B

EXISTING LIMESTONE CORNICE EDGE CONDITION. WATER INFILTRATION AT COMMON BRICK BACK-UP WALL.

CARVED LIMESTONE UNITS TO BE CLEANED OF EFFLORESCENCE AND DIRT AND GRIME, TYP.



WORST-CASE CONDITION AT ONE OF SEVEN CARTOUCHE LOCATIONS. KEYSTONE UNITS SHIFTED DOWN AND OUT OF PLANAR ALIGNMENT.

Scale 1/2" = 1'-0"

UIHLEIN WILSON ARCHITECTS

| | |
|---|---|
| Title | SECTION AT SOLID BALUSTRADE WITH CARTOUCHE, TYP. |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
| Project Number | Milwaukee County O118-13449; UWA 13-121 |
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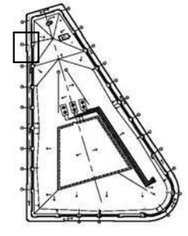
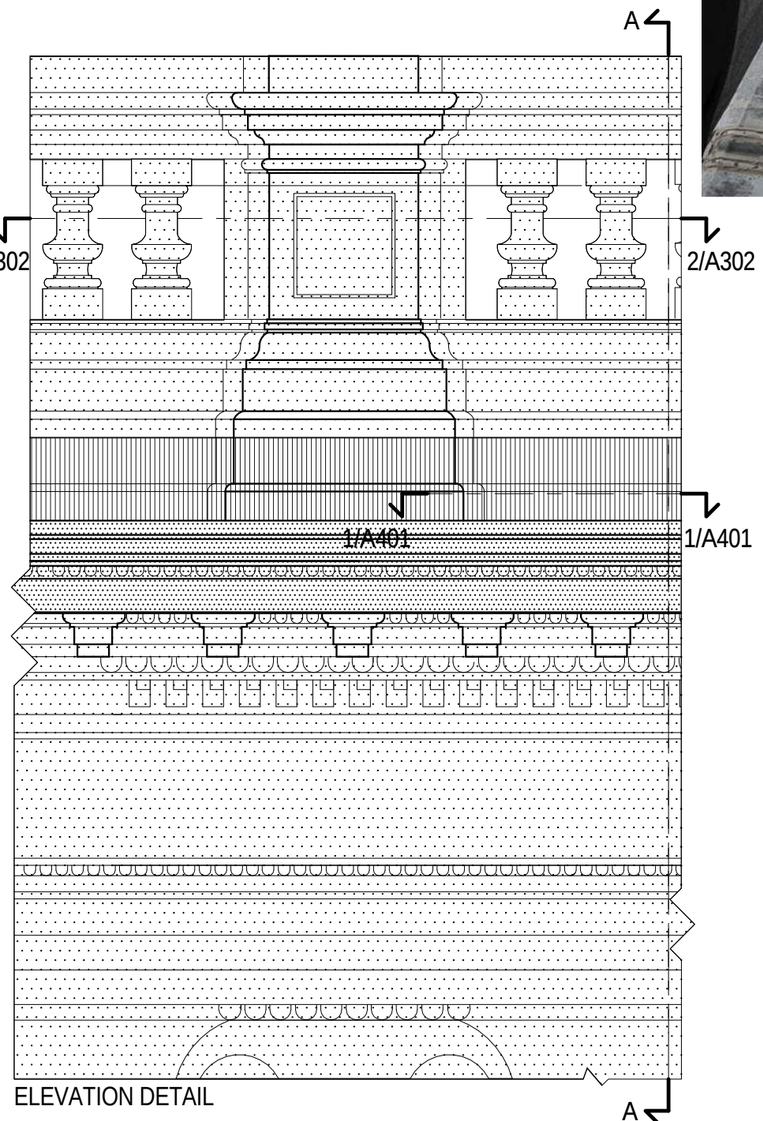
| Drawn by | UWA |



Drawing No.

A301

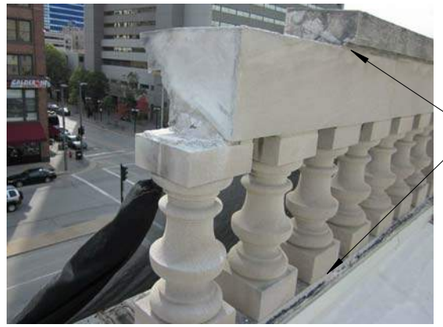



ELEVATION DETAIL




SECTION A - A

1 ELEVATION AND SECTION AT BALUSTRADE, TYP.
1/2" = 1'-0"



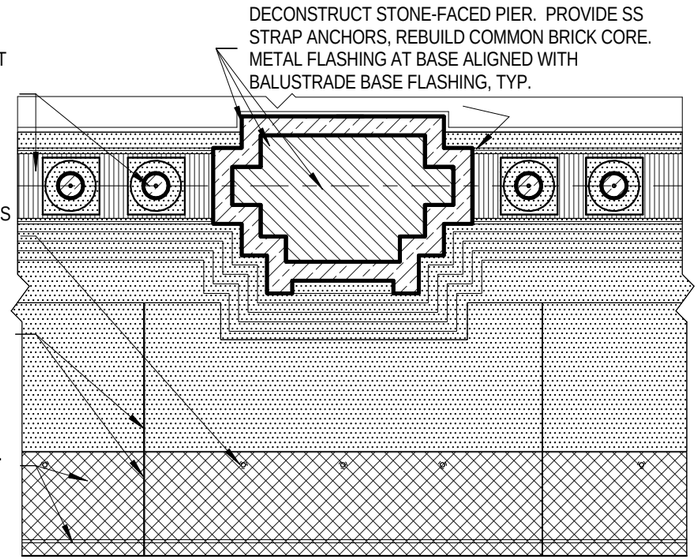



CORE-OUT CORRODED BALUSTER PINS AT RAIL AND BASE. PROVIDE SS PINS. METAL FLASHING, SEALANT/MASTIC, TYP.

SS THREADED PINS AT QUARTERS, MORTAR SET.

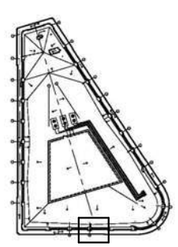
MATCH JOINT WIDTHS. MORTAR TYPE 'O'.

LIMESTONE DUTCHMAN TO MATCH EXISTING CORNICE LENGTH. PRE-CUT REGLET FOR METAL FLASHING DRIP EDGE.




2 BALUSTERS, PIER, EXPOSED CORNICE W/STONE DUTCHMAN - PLAN DETAIL
1/2" = 1'-0"

Scale 1/2" = 1'-0"

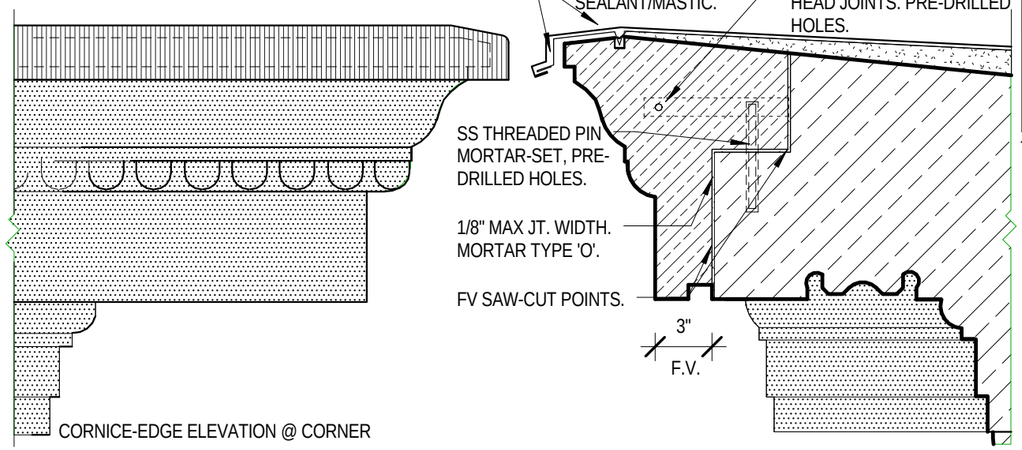


UIHLEIN WILSON ARCHITECTS

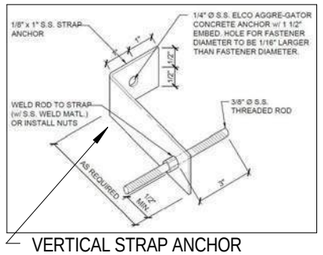
| | |
|---|---|
| Title | SECTION, PLAN AT BALUSTRADE WITH PIER, TYP. |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
| Project Number | Milwaukee County O118-13449; UWA 13-121 |
| Date | March 2014 |
| Drawn by | UWA |

Drawing No.

A302



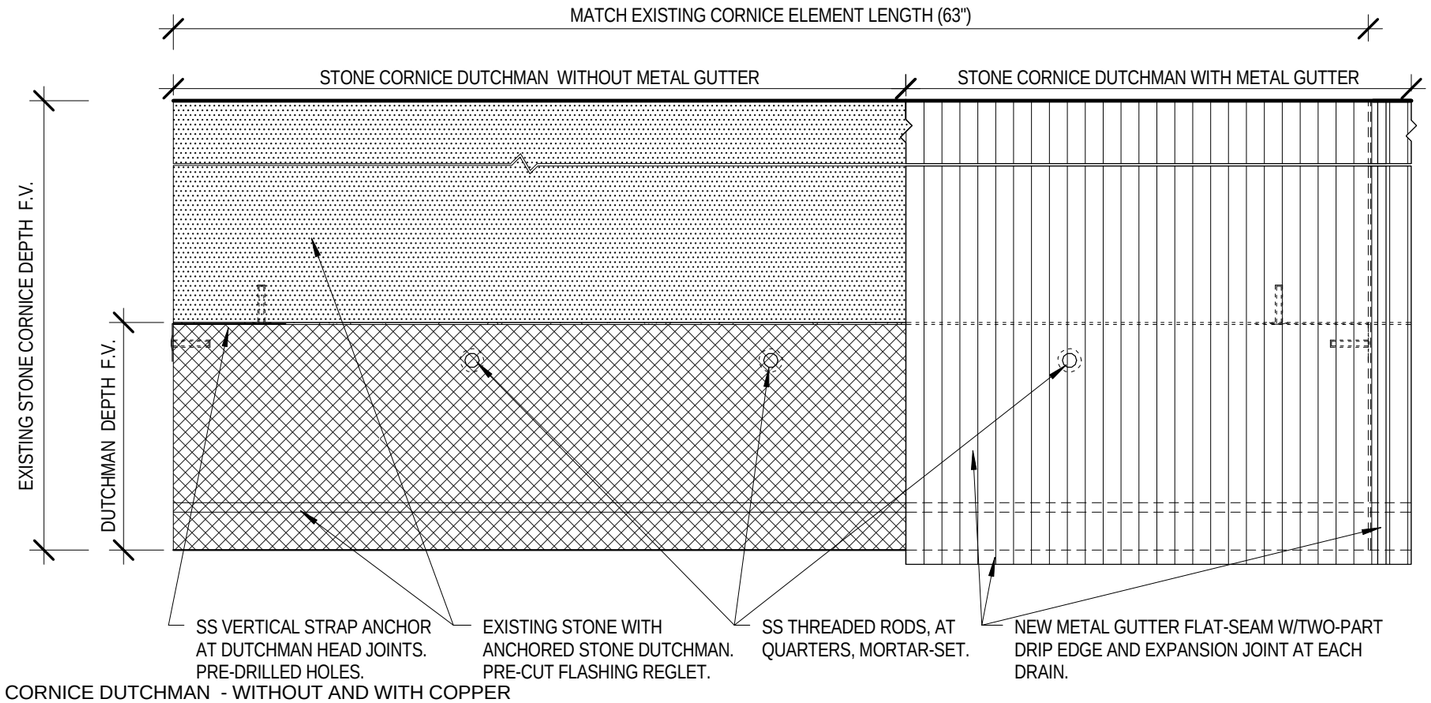

3 CORNICE DUTCHMAN - SECTION DETAIL
1 1/2" = 1'-0"




VERTICAL STRAP ANCHOR FOR USE IN HEAD JOINTS. NTS




2 CORNICE FLASHING, DRAIN - SECTION DETAIL
1 1/2" = 1'-0"




CORNICE DUTCHMAN - WITHOUT AND WITH COPPER ALLOY GUTTER - PLAN DETAIL
1 1/2" = 1'-0"

ACCUMULATED SEDIMENT, TYP.

CONDUCTOR NOTCHED INTO STONE, LOW PITCH.

FLASHED-IN OPENING OF DRAINAGE CONDUCTOR. LONG-STANDING WATER FOUND AT ENTIRE PERIMETER.

UIHLEIN WILSON ARCHITECTS

| | |
|---|---|
| Title | DUTCHMAN AT CORNICE - PLAN, SECTION DETAILS |
| Project | MCHS Exterior Renovation Investigative Study<br>910 N. Old World Third St. Milwaukee, WI 53203 |
| Project Number | Milwaukee County O118-13449; UWA 13-121 |
| Date | March 2014 |
| Drawn by | UWA |

Scale 1 1/2" = 1'-0"

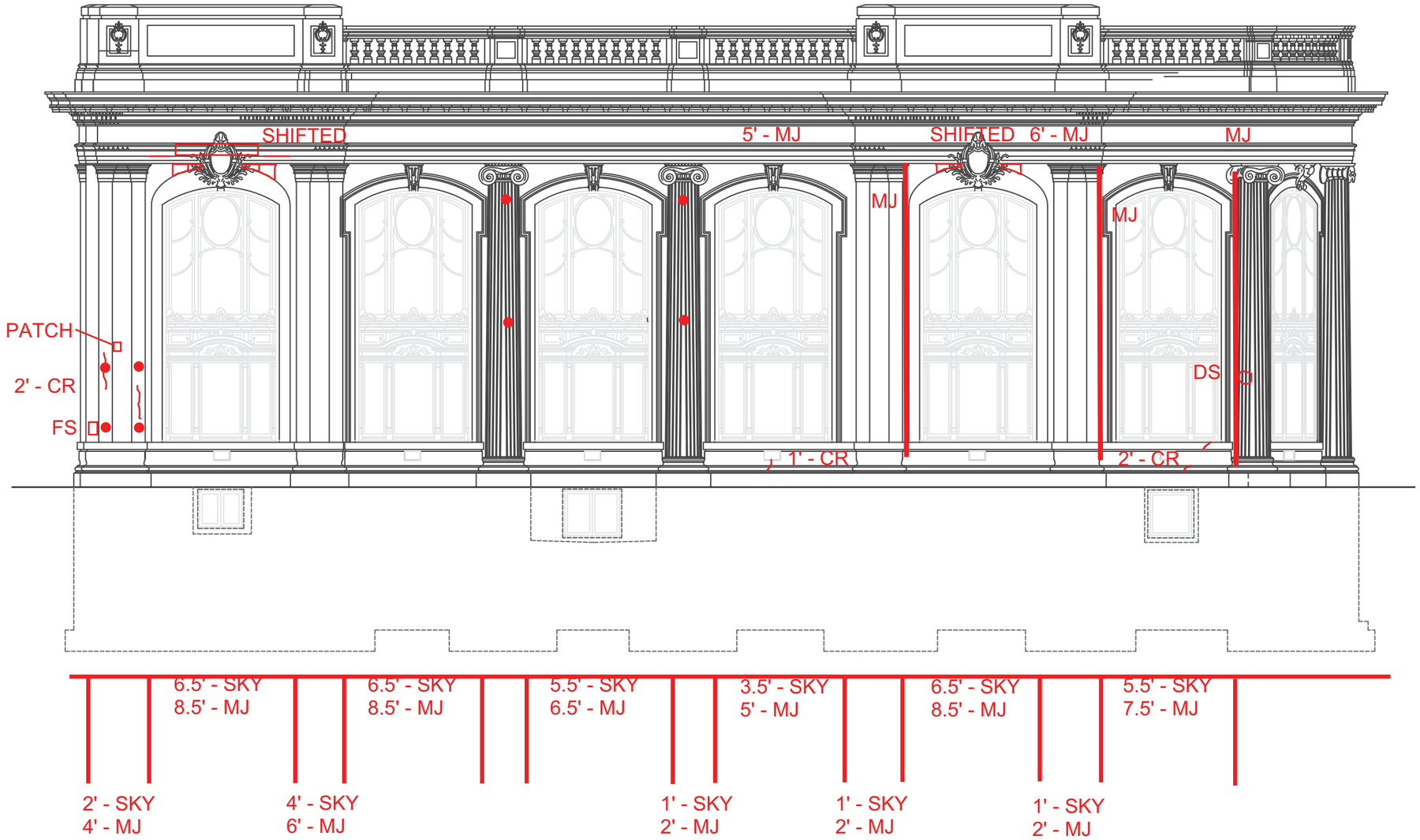
Drawing No.

A401

DRAWING KEY :

FS = FLAT SPALL
DS = DECORATIVE SPALL
MJ = CRACKED MORTAR JOINT
SKY = SKYWARD FACING JOINT
CR = CRACK IN LIMESTONE
● = ATTACHMENT LOCATION

# Kilbourn St. Elevation (SOUTH)



# 3rd Street Elevation (WEST)

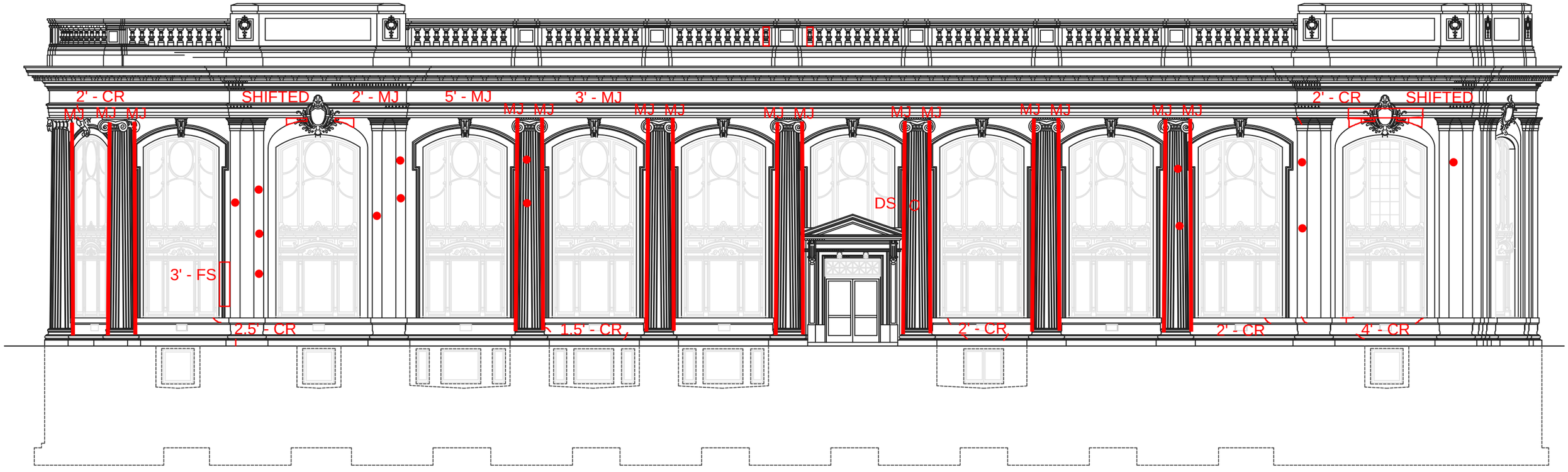
DRAWING KEY :

FS = FLAT SPALL
DS = DECORATIVE SPALL
MJ = CRACKED MORTAR JOINT
SKY = SKYWARD FACING JOINT
CR = CRACK IN LIMESTONE
● = ATTACHMENT LOCATION

DRAWING KEY :

FS = FLAT SPALL
DS = DECORATIVE SPALL
MJ = CRACKED MORTAR JOINT
SKY = SKYWARD FACING JOINT
CR = CRACK IN LIMESTONE
● = ATTACHMENT LOCATION

# Pere Marquette Park Elevation (EAST)




3.5' - SKY
3.5' - MJ

3.5' - SKY
7.5' - MJ

2' - MJ

5.5' - SKY
5.5' - MJ

2.5' - SKY
5' - MJ

4.5' - SKY
8.5' - MJ

3.5' - SKY
7.5' - MJ

6.5' - SKY
8.5' - MJ

4' - SKY AT DOOR
11' - MJ AT HEADER
20' - MJ AT DOOR

5.5 - SKY
7.5' - MJ

5.5' - SKY
7.5' - MJ

4.5' - SKY
7.5' - MJ

1' - SKY
3' - MJ

8.5' - SKY
6.5' - MJ